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JEL codes: G01; G15; G02; F30.

Key words: Liquidity; Illiquidity; Latin America; VIX; Financial Crisis.

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Abstract

We dissect the impact of liquidity on returns of Latin American firms using a detailed data set of firm characteristics over various market cycles. We find that firm-level liquidity (illiquidity) is positively (negatively) associated with returns. Further analysis reveals that global illiquidity and endogenously determined crisis periods are negatively associated with returns. Our results are in contrast to the majority of the literature on developed markets and indicate that liquidity is less of an important risk factor in Latin America. Our results suggest that improvements in firm-level liquidity will enhance returns and reduce the vulnerability of returns to global illiquidity.
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1 Introduction

Share liquidity is an important consideration when making asset allocation decisions in emerging markets. In this paper we dissect the relationship between returns and liquidity for the major Latin American equity markets. Liquidity has various dimensions comprising: the spread, the price impact of trades, the ability to trade quickly, transactions costs, and volume. To understand the nuanced relationships among returns and different facets of firm level liquidity several econometric models are estimated. More precisely, we contribute to the literature by considering the illiquidity premium hypothesis for a comprehensive set of Latin American firms over several market cycles. Amihud and Mendelson (1986, 2008) argue that less liquid shares need to be traded at a discount to attract investors. Investors who purchase illiquid assets will discount the price to compensate for greater transaction costs should they reverse the transaction. This will generate a negative (positive) relationship between returns and liquidity (illiquidity) measures. In general, the literature has confirmed this hypothesis in mature equity markets.

We show that liquidity (illiquidity) is generally positively (negatively) associated with equity returns. These findings are in contrast with the majority studies of developed markets which report a liquidity premium or a negative (positive) association between liquidity (illiquidity) measures and returns. We suspect these results stem partially from the diversification benefits of Latin American stocks outweighing illiquidity concerns. Alternatively, some empirical liquidity measures are likely capturing investor sentiment. Therefore, the positive relationship among some liquidity variables and returns are likely partially driven by investor sentiment. A final explanation for our results relates to the recent literature on corporate governance from emerging markets. Share liquidity in emerging markets increases market monitoring of managers, which produces higher returns.

In the second phase of our analysis, we explore the role of global illiquidity and endogenously determined financial crisis periods on equity returns. We proxy global liquidity with the implied volatility of the Standard and Poor's 500 index option (SPX), commonly referred to as the Chicago Board Options Exchange Volatility Index (VIX). Furthermore, to examine the impact of firm level liquidity on returns, without the contamination of financial crisis periods we control for endogenously determined financial crises. We find that global illiquidity and financial crisis periods are negatively associated with equity returns in Latin America. However, firm level liquidity proxies remain consistently signed and important to understanding returns.

A final contribution of this research is to construct firm level liquidity and illiquidity indices taking into account the various dimensions of liquidity (illiquidity). Using factor analysis, we construct a liquidity and an illiquidity factor. Liquidity and illiquidity capture about 72% of the variance in our observed liquidity measures. We then run a series of panel regressions including these factors as explanatory variables on returns in Latin America. The results of these regressions indicate a strong positive association between liquidity and returns, while illiquidity is negatively related to returns. These results corroborate our earlier findings and demonstrate that unlike in many developed nations, firm level liquidity (illiquidity) appears to relate positively (negatively) with returns. These results suggest that liquidity is a less important risk factor in Latin American markets.

To test the robustness of our results, we control for the January effect and momentum in equity prices. Our results remain consistent in most circumstances. Overall, we demonstrate that

liquidity in Latin America has multiple dimensions and various aspects of liquidity have asymmetric impacts on returns. Furthermore, we show that the relationships between the dimensions of liquidity and returns are not the same as in mature markets.

This research has important implications for the development of financial markets in Latin America. Our results demonstrate that firm level as well as global liquidity are important considerations when pricing securities in emerging markets. Efforts by policy markets to improve liquidity in Latin America are needed to enhance returns and reduce information asymmetry. Incremental improvements in firm-level liquidity should reduce the vulnerability of equity prices to contractions in global liquidity.

The remainder of this paper proceeds as follows. Section 2 reviews the literature on the relationship between illiquidity (liquidity) and returns. Section 3 describes the data, variables, and methodologies. Section 4 presents and analyze the empirical results. Section 5 provides a summary of observations and concludes.

2 Literature review

Amihud and Mendelson (1986)'s work opened the flood gates to numerous empirical studies suggesting that liquidity may be a relevant factor to explain stock returns. The reasoning behind Amihud and Mendelson's model is that illiquidity can be measured as the costs of immediate execution of a trade. And an investor willing to transact at a favorable price faces a trade-off: She may either wait to transact at a favorable price or insist to execute a transaction immediately. Transaction costs represent a cash outflow that reduces returns. This higher required rate of returns implies a lower market value for illiquid firms. Numerous empirical studies have demonstrated that time varying liquidity (illiquidity) measures impact stock returns negatively (positively) confirming the idea of an illiquidity premium in developed markets (Chordia et al., 2001, 2008; Avramov and Chordia, 2006).

Additionally, Brennan and Subrahmanyam (1996) and Glosten and Milgrom (1985) note that a primary cause of illiquidity in financial markets is adverse selection, which arises from the presence of informed traders. If a marginal investor is uninformed, she may demand higher rates of return when the adverse selection problem is more severe. For developed equity markets, the influence of liquidity on stock returns is studied extensively and generally provides support for the illiquidity premium hypothesis.[1]

Equities in emerging markets are generally less liquid than those in developed markets. Money managers are concerned about holding period returns net of transaction costs. Since illiquid securities increase transaction costs investors require a higher gross returns to move funds from liquid assets into illiquid securities. Based on standard asset pricing models, theoretical research generally concludes that the lower the liquidity, the higher the required rate of returns. This higher required rate of return is to compensate investors for bearing the illiquid risk. Indeed, Bekaert et al. (2007) point out that liquidity risk is particularly important for the less sophisticated markets where the number of securities and investors is scarce.

Empirical evidence on the relationship between liquidity (illiquidity) and returns in emerging markets remains murky. Dey (2005) studies liquidity as a determinant of cross-sectional returns

[1] Examples of these studies include among others: Acharya and Pedersen (2005); Chang et al. (2010); Gârleanu (2009); Keene and Peterson (2007); Limkriangkrai et al. (2008); Marcelo and Quirós (2006); Nguyen et al. (2007) and Pástor and Stambaugh (2003).

for 49 global stock index portfolios. The findings indicate a positive association between return and share turnover. However, additional tests demonstrate, that this relation only holds in emerging markets. The author concludes that determinants of liquidity risk differs between emerging and developed markets. In a study of Chinese stock markets, Chung et al. (2005) find a positive relationship between returns and bid-ask spreads, supporting the notion of an illiquidity premium in this emerging market. However, Minardi et al. (2005) conclude that more liquid firms in Brazil exhibit higher returns, in contrast to the illiquidity premium found in the developed markets and China.

In their comprehensive paper, Bekaert et al. (2007) show that in Latin American and Southeast Asian stock markets liquidity is a priced factor and its importance did not change after liberalization. The authors discover that unexpected liquidity shocks are positively correlated with contemporaneous return shocks and are negatively correlated with dividend yields.

Hearn and Piesse (2009) propose a liquidity and size augmented CAPM model to study returns on a set of African equity markets. They show that size and liquidity factors are important for explaining asset prices. In a follow up paper, Hearn (2011) suggests that there is a less clear impact of liquidity on asset pricing. As the impact of liquidity depends on characteristics of a stock market. Studying the relationship between liquidity and asset pricing in an international setting. Lee (2011) shows that liquidity is priced even after controlling for market, size, and value factors. Lee's results indicate that stocks listed in emerging markets are generally characterized by high liquidity risk compared to developed markets. A recent paper by Batten and Vo (2014), finds a positive association between liquidity and returns in Vietnam. They argue that the failure to find a liquidity premium in Vietnam is due to the lack of integration among emerging markets and developed markets. According to their argument, investors may overlook illiquidity if the diversification benefits of a non-integrated market are large enough.

An alternative explanation for the relationship between liquidity and returns is given by the recent work in behavioral economics. This argument is characterized by the work of Baker and Stein (2004). Their basic idea is as follows, in a market with short-sales constraints, market liquidity (illiquidity) can be a sentiment indicator. An abnormally liquid (illiquid) market is one in which pricing is being dominated by irrational investors, who tend to underreact (overreact) to information. Therefore, high liquidity (illiquidity) is a signal that sentiment of these investors is positive (negative) and returns are therefore expected to be low (high). Numerous empirical studies have explored the relationship between investor sentiment and equity returns (e.g., Kenneth L. Fisher, 2000, 2003; Baker and Wurgler, 2006; Brown and Cliff, 2005; Bathia and Bredin, 2013). These studies find that high (low) investor sentiment is associated with low (high) future equity returns. Several sentiment proxies have been developed to examine their effect on equity returns, such as the Consumer Confidence Index and Investor Intelligence survey, closed-end fund discount, mutual fund flows, and share turnover. Directly related to the current research, Baker and Stein (2004) suggest turnover as a proxy of investor sentiment, which is the measure of liquidity Batten and Vo (2014) employ.

A final potential explanation for the relationship between returns and liquidity is taken from the corporate governance literature. The current literature on the relationship between liquidity and corporate governance has yet to reach a consensus. This literature has evolved along two major lines of argumentation. An example of a paper supporting the first line of argumentation belongs to Bhide (1993). Bhide argues that enhanced market liquidity often comes at an expense

for efficiently governed of firms. As the number of investors increases, particularly institutional shareholders, there tends to be increased monitoring. The increase in monitoring has a cost for firms that are ex ante efficiently governed. Burkart et al. (1997) find support for this argument and document excess monitoring by large shareholders. Kahn and Winton (1998) analyze the relationship between liquidity and monitoring by large shareholders. They argue that market liquidity can undermine effective control by block holders by giving them excess incentives to speculate rather than monitor.

However, Maug (1998) argues that the trade-off between liquidity and control does not exist. A more liquid market allows a large shareholder to sell stocks more easily, but, by the same token, also makes it easier for him/her to accumulate large stakes. Maug derives a model of the large shareholder's decision process to monitor a company and analyzes the relationship between stock market liquidity and corporate governance in equilibrium, which implies that liquid stock markets tend to support effective corporate governance. Support for Maug's argument is provided in several empirical studies.[2] Chung et al. (2010) construct a corporate governance index to examine the effect of corporate governance on liquidity using a sample of United States firms. Their results indicate that time-varying liquidity, measured by spreads and price impact are explained by their time-varying corporate governance index. They argue that the improvement of stock liquidity mainly contributes to the reduction of information asymmetry between insiders and outside investors. Liquidity may help discipline management, mitigate agency problems, and thus improve firm performance (Admati and Pfleiderer, 2009). Khanna and Sonti (2004) assert that liquidity simulates the entry of informed traders who make prices more informative to other shareholders. Thereby improving firms operating performance and stock prices. Fang et al. (2009) find empirical support for this argument.

Empirically, Li et al. (2012) demonstrate that multiple measures of liquidity (illiquidity) positively (negatively) impact time varying corporate governance measures, which simultaneously produce higher valuations for Russian firms. In regards to Latin America, Chavez and Silva (2009) investigate the impact of the introduction of 'Special Corporate Governance Levels', which aim at an improvement of corporate transparency and investor protection, on liquidity of Brazilian equities. They find that liquidity and firm value are enhanced for companies who choose to list in these special governance segments.

On the one hand, if the liquidity induces excess monitoring argument is correct, more liquidity is expected to reduce firm value (returns). On the other hand, if liquidity acts as an effective market discipline of management we would expect more liquid securities to have higher values (returns).

It should be noted that the majority of studies use a single measure of liquidity. For example, Acharya and Pedersen (2005); Kamara et al. (2008) and Marcelo and Quirós (2006) use the Amihud measure; Datar et al. (1998); Haugen and Baker (1996) and Rouwenhorst (1999) use turnover; Amihud and Mendelson (1986); Chordia et al. (2001) and Jacoby et al. (2000) use bid-ask spread. However, some recent studies use several measures of liquidity. For example Chordia et al. (2001); Keene and Peterson (2007); Lam and Tam (2011) and Li et al. (2012). Since liquidity is challenging to measure we use multiple measures in our empirical analysis.

[2] See Jain (2003), Brockman and Chung (2003), and Kim et al. (2006) for early examples of this research.

3 Data

We gather firm level data from the five largest equity markets in Latin America. We extract data for Brazil, Chile, Colombia, Mexico, and Peru for the period of January 2007 to December 2015 from Bloomberg data services. Price data are available with daily frequency, while the number shares outstanding, market capitalization, and book value are observed monthly. Data on the VIX are obtained from the St. Louis Federal Reserve at a monthly frequency. The frequency of the final data set is weekly, daily variables are averaged weekly, and monthly data repeat its value for each month. The final sample size is close to 60,000 observations and contains more than 200 individual equities.

Figure 1 plots the time path of the equity markets over our sample period. Our selected sample contains several interesting periods in which to analyze the impact of liquidity on returns. The pre-Global Financial Crisis (GFC) period (2007 Q1 to 2008 Q3) is characterized by loose monetary policy and credit expansion, which led to increases in asset prices. The GFC period (2008 Q3 to 2009 Q1) a period of contraction and credit tightening leading to a reduction in global liquidity. Following the GFC, liquidity returned to financial markets as fiscal and monetary stimulus attempted to inflate the global economy. Figure 1 demonstrates that the equity markets of Latin America rallied during this period as market recovered to levels above their pre-crisis levels. Following the recovery Latin American firms have struggled to maintain consistent growth. The fall of commodities prices and the slower than expected growth in Europe and Asia are often cited as reasons for the less than impressive recent performance of Latin America's equity markets. We note that all five markets remain well below their peaks in 2011.

3.1 Liquidity measures

Liquidity is difficult to define and even more difficult to estimate (Lesmond et al., 1999). Since liquidity has several dimensions, we use a variety of liquidity measures to capture how various aspects of firm level liquidity impact returns in Latin America. We now turn to the definition and explanation of these liquidity proxies.

Turnover is the ubiquitous in studies of liquidity.[3] Following existent literature, we calculate *Turnover* as the natural logarithm of the number of shares of stock i traded to the number of shares outstanding. Turnover measures the frequency of trading with higher values associated with greater levels of liquidity. A second related liquidity measure is Market Value Turnover (MVTN). MVTN is calculated as the natural logarithm of the value of shares of stock i traded to market capitalization of firm i. Similar to Turnover, MVTN measures the frequency of trading but as a percentage of firm value rather than a percentage of shares. While these turnover measures capture trading volume they fail to account for costs per trade.

Our next measure of liquidity indirectly infers trading costs based on the occurrence of zero return days. Proportion of Zero Return days (PZR) is calculated as follows:

$$\text{PZR} = \frac{\sum zr_d}{dym}$$

where zr_d is the dummy for zero-return day (i.e. $zr_d = 1$ if $\text{RET}_d = 0$ and zero otherwise), and *dym* = number of trading days in a firm month (Lesmond et al., 1999). A value of 0 implies that

[3] See Bekaert et al. (2003) and Levine and Schmukler (2003) for two excellent examples.

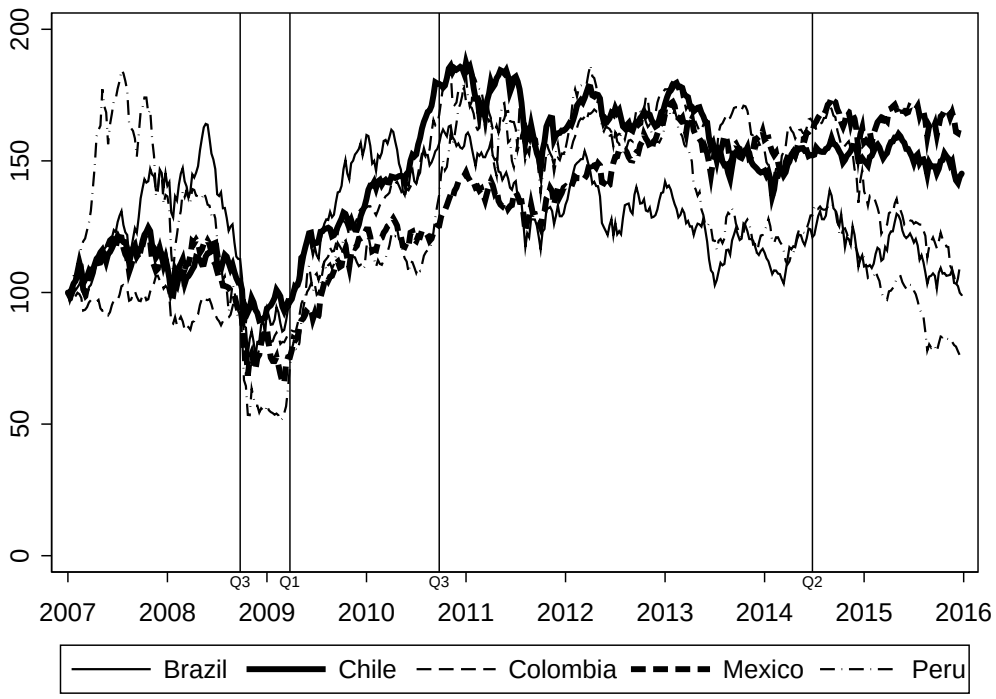

Figure 1. Latin America's stock market.
Notes: The figure shows each country's stock market performance. Index = 100 in January 2005.

a firm's stock traded every trading day in a given month, whereas a value of 1 implies that a firm's equity did not trade in a given month. According to Lesmond et al. (1999), the marginal informed trader will trade only if the value of information exceeds the marginal costs of trading. Therefore if trading costs are large, zero return days will occur more frequently as information must accrue longer before it becomes worthwhile for an informed trade. In this way, PZR is an indirect measure of trading costs. PZR is also commonly considered an illiquidity measure where a larger value implies less liquidity (Li et al., 2012).

We also employ the methods of Amihud (2002) to directly measure illiquidity. The average of the Amihud (2002) daily illiquidity ratios during a firm month is defined as the natural logarithm of the following:

$$\text{ILQ} = \overline{\left(\frac{|\text{RET}_d|}{\text{Volume}_d}\right)} * 10^6$$

where the subscript d denotes a day, and the bar represents the sample average. In essence this is the price impact of a trade. Large values of Iliquidity Ratio (ILQ) imply that order flows have a large impact on prices. The advantage of this illiquidity measure is that it can be calculated for days when there is no price change, which is of concern in Latin American equity markets. It is suspected that this measure will be related to our final firm level liquidity measure, the bid-ask (BID-ASK) spread, as smaller bid-ask spreads are typically associated with lower price impacts. The BID-ASK spread is calculated as follows:

$$\text{BID-ASK} = \frac{\text{Ask - Bid}}{\text{Ask}}$$

The BID-ASK spread directly captures the costs of trading. The BID-ASK spread is generally decomposed into three components: order processing, inventory holding, and adverse selection (or adverse information) components. As documented in George et al. (1991), Hasbrouck (1988), Madhavan and Smidt (1991), and Stoll (1989), inventory holding costs are relatively small in developed markets. The adverse selection component is typically used as the proxy for the cost of asymmetric information. Larger bid-ask spreads increase the costs of trading and typically associated with lower levels of liquidity and greater levels if information asymmetry.

While firm level liquidity and returns are the primary focus of this research, inspired by the work of Brockman et al. (2008), who demonstrate the impact of market wide liquidity on individual firm liquidity, we include the VIX as a proxy of global liquidity in several empirical specifications. The VIX measures the implied volatility of the S&P 500 index option and is sometimes referred to as the 'fear index' in academic literature and the financial press. During periods of high implied volatility, market participants retrench into 'safe haven' assets and global liquidity declines. We therefore anticipate a negative relationship between the VIX and returns for major Latin American equity markets. The past four decades, have witnessed capital markets becoming more globalized due to lower transactions costs and the movement towards lower levels of capital controls. The globalization of financial markets makes it important to consider and control for the impact of global liquidity on returns.

3.2 Financial crisis

Given the sample period under consideration it is important to understand the impact of financial crisis periods on the relationships between liquidity and returns. Rather than determining financial crises months in an ad-hoc fashion, we follow the identification strategy of Patel and Sarkar (1998), Coudert and Gex (2008), and Li et al. (2015) to endogenously define equity crisis months. This method requires calculation of the Current to Maximum price (CMAX) ratio. Patel and Sarkar (1998) define CMAX_t as the ratio of an index level at month t to the maximum of an index level for the period up to month t. Coudert and Gex (2008) and Li et al. (2015) set 24 months as a rolling period in calculating the CMAX_t ratio. The current research follows Coudert and Gex (2008) and Li et al. (2015) method to calculate the CMAX as well as the corresponding crisis indicator FC_t.

$$\text{CMAX}_t = \frac{P_t}{\max(P_t, \ldots, P_{t-24})} \tag{1}$$

where P_t is a country's stock market index level in month t.

A low value of CMAX_t indicates a larger price decline in the index level over a 24-month period. The CMAX_t ratio is capped at 100%. A CMAX_t ratio of 100% indicates that the index level in that month rises to the maximum value in the rolling 24-month period.

For empirical estimation, the CMAX ration must be translated to a financial crisis indicator (FC_t). This is because the CMAX ratio is a continuous variable, but the occurrence of a financial crisis is a discrete outcome. We define a financial crisis week as one where the CMAX_t is less than two standard deviations below its mean value.[4]

$$FC_t = \begin{cases} 1 & \text{if } \text{CMAX}_t \leq \overline{\text{CMAX}_t} - 2\rho_t \\ 0 & otherwise \end{cases} \tag{2}$$

[4] Patel and Sarkar (1998) document that in the beginning of a market crash, the equity price index falls to two standard deviations below the mean value of CMAX_t for developed markets, which is about a 20 percent relative decline in the price index. Coudert and Gex (2008) use two standard deviations below the mean value of CMAX_t as the threshold value.

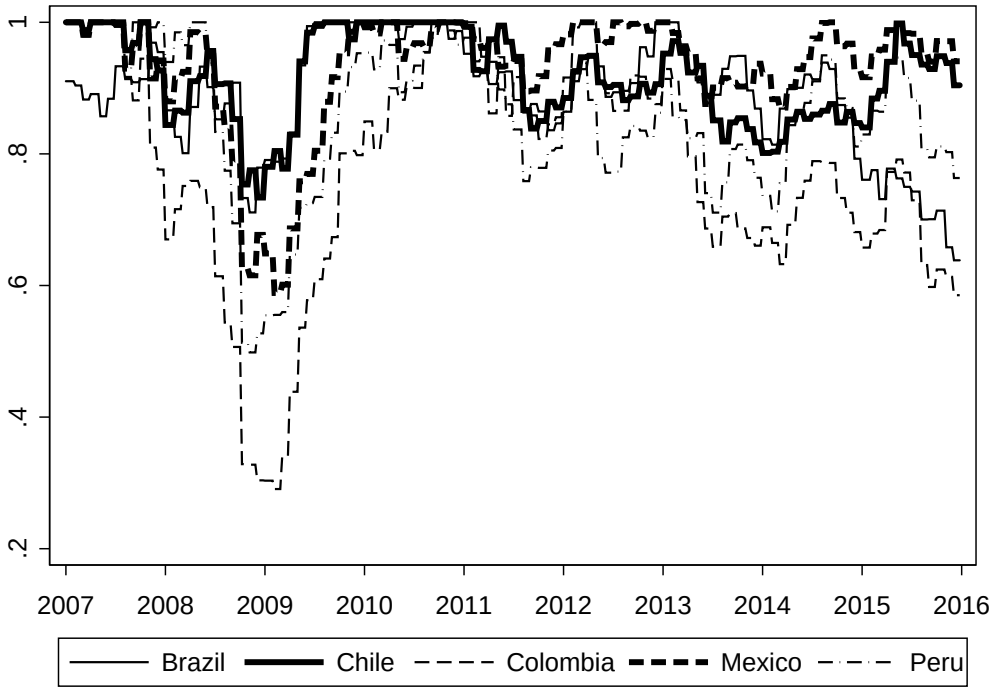

Figure 2. CMAX.
Notes: The figure shows each country's stock market CMAX.

where ρ_t is the standard deviation of CMAX_t.

To derive statistics in a large sample, the mean value and the standard deviation of CMAX_t for the first 24 month in the sample period was calculated, adding an additional month at a time to the sample in calculating these two statistics in each of the following months. Figure 2 plots the time path of the CMAX ratio for the five equity markets under consideration. It is noted that the financial crisis months identified correspond to the periods commonly identified as crisis months. It is also observed that Colombia and Peru experienced the steepest declines in the CMAX ratio surrounding the 2008 global financial crisis.

3.3 Returns and financial control variables

The dependent variable in all our empirical specifications is monthly Return (RET) for firm 'i' in country 'j'. As the objective of this research is to understand the general relationship between returns and liquidity, we eliminate extreme return observations and employ 1% trimming. Inspired by prior work on returns and liquidity, we incorporate several firm characteristic variables in to our empirical models (Batten and Vo, 2014).

A voluminous literature documents a relationship between a countries index and firm level returns. The Beta coefficient for security i is obtained from a 52 week window regression estimated as follows.

$$RET_i = \beta_0 + \beta_1 RET_{m,t} + e_t \tag{3}$$

where $RET_{m,t}$ represents the return on country 'm's stock index at time 't'. We suspect a positive relationship between BETA and returns in Latin America (Lischewski and Voronkova, 2012).

Despite the wide acceptance of the market model to describe returns, several anomalies have been uncovered in financial markets. We formally control for the two most commonly observed risk factors, specifically, book-to-market and size. Book-to-Market equal to the book value of equity of firm 'i' divided by the market value of firm 'i'. Book-to-Market is included to capture the value effect. That is the observation that firms with value firms tend to outperform growth firms. We suspect that higher book-to-market ratios should be positively related to returns is Latin American equity behave similarly to developed markets. To control for firm size, we include the natural logarithm of each firm's market capitalization. Many empirical researchers have documented a relationship between firm size and returns with some finding a positive impact and others documenting a negative impact (the small firm effect). Given the inclusive evidence on firm size on returns we include it to determine the impact of firm size on returns in Latin America. Finally, to control for year, country, and industry heterogeneity we add appropriate dummies within our empirical framework.

Tables 1 and 2 present the summary statistics of key variables. Table 1 contains liquidity and return variables for each country, while 2 contains summary statistics of the control variables.

Several interesting empirical facts emerge from the consideration of the summary statistics. Results for PZR provide strong evidence that many equities in Latin American are very illiquid. For example, the proportion of zero-return days is 66.7% of trading days for the average Latin American firm in our sample. However, we note that some firms were very liquid with no zero return days and other firms tended to be very illiquid with the most illiquid firm in our sample reporting over 82.6% of days without a price movement. These results are reasonably consistent across the five countries in our sample.

The costs of trading in many Latin American firms can be substantial, with the average Bid-Ask spread averaging 3%. On average the highest Bid-Ask spread occurred in Brazil at 4.77% and the lowest spreads are observed in Mexico at 1.91%. The statistics point to the fact the Latin American equities are dissimilar to those in developed markets, where firms trade more often and the costs associated trading is significantly lower. The averages on control variables are consistent among countries in our sample with Beta averaging 0.89. The highest Beta is observed in Chile at 0.985 and the lowest Beta is observed in Brazil at 0.708. Valuation is an important consideration when comparing markets internationally. We note that the average book-to-market for all firms in our sample is 0.701. The highest book-to-market is reported in Colombia (closely followed by Peru) at 0.732, while the lowest book-to-market belongs Mexico (closely followed by Brazil) at 0.651. Overall our summary statistics reveal that these Latin American markets display many similarities to each other, but are very different than the nations for which the majority of studies on liquidity and returns have been conducted.

Table 1. Liquidity descriptive statistics

Country	Variables	N	mean	min	max	sd
All countries	Bid-Ask	55,197	0.030	3.17e-05	1	0.047
	ILQ (Ln)	52,349	-3.842	-14.49	11.61	3.772
	MVTN (Ln)	58,655	5.624	-6.411	11.97	1.916
	PZR	59,952	0.667	0	0.826	0.191
	Turnover (Ln)	58,143	10.55	-4.182	20.70	3.404
	Return	59,952	0.432	-22.56	29.68	7.588
Brazil	Bid-Ask	6,321	0.047	0.000*	1	0.079
	ILQ (Ln)	5,409	0.477	-7.139	11.61	3.795
	MVTN (Ln)	6,299	5.365	-3.777	10.50	2.624
	PZR	6,321	0.564	0	0.826	0.235
	Turnover (Ln)	6,299	7.810	-1.949	15.04	2.991
	Return	6,321	0.124	-22.49	29.54	8.614
Chile	Bid-Ask	23,215	0.032	3.17e-05	0.769	0.045
	ILQ (Ln)	23,361	-5.449	-14.49	3.745	2.472
	MVTN (Ln)	25,107	5.664	-4.198	11.97	1.703
	PZR	26,379	0.743	0.571	0.826	0.051
	Turnover (Ln)	25,053	12.09	-3.521	20.70	2.590
	Return	26,379	0.277	-22.54	29.55	7.221
Colombia	Bid-Ask	5,117	0.027	7.63e-05	0.744	0.029
	ILQ (Ln)	5,596	-7.555	-12.32	0.169	1.799
	MVTN (Ln)	6,104	5.426	-0.319	10.97	1.305
	PZR	6,106	0.632	0	0.818	0.194
	Turnover (Ln)	5,665	14.09	6.807	20.00	2.176
	Return	6,106	0.174	-22.38	28.85	6.126
Mexico	Bid-Ask	15,183	0.019	0.000*	0.942	0.038
	ILQ (Ln)	13,815	-2.839	-9.935	10.88	2.847
	MVTN (Ln)	15,499	6.019	-6.411	11.45	1.969
	PZR	15,500	0.647	0	0.826	0.223
	Turnover (Ln)	15,480	9.311	-4.182	18.50	2.496
	Return	15,500	0.934	-22.56	29.68	7.668
Peru	Bid-Ask	5,361	0.037	5.89e-05	0.263	0.034
	ILQ (Ln)	4,168	1.220	-7.490	7.793	2.896
	MVTN (Ln)	5,646	4.858	-1.608	10.89	1.978
	PZR	5,646	0.517	0	0.826	0.269
	Turnover (Ln)	5,646	6.663	-0.371	13.84	2.639
	Return	5,646	0.406	-22.53	29.67	9.041

Notes: Liquidity / illiquidity variables descriptive statistics. All countries. * indicates a non-zero value before rounded to three decimal places.

Table 2. Control variables descriptive statistics

	Variables	N	mean	min	max	sd
All countries	Beta	59,952	0.893	7.99e-05	3.993	0.558
	Book-to-Market	59,952	0.701	0.000*	3.995	0.539
	Financial crisis (FC) (Dummy)	59,952	0.101	0	1	0.301
	Size (Ln Mk cap)	59,952	11.62	2.862	19.27	3.024
Brazil	Beta	6,321	0.708	7.99e-05	3.829	0.450
	Book-to-Market	6,321	0.655	0.028	3.979	0.640
	Financial crisis (FC) (Dummy)	6,321	0.076	0	1	0.265
	Size (Ln Mk cap)	6,321	7.765	2.897	12.63	1.804
Chile	Beta	26,379	0.985	0.000*	3.993	0.602
	Book-to-Market	26,379	0.728	0.000*	3.967	0.528
	Financial crisis (FC) (Dummy)	26,379	0.097	0	1	0.297
	Size (Ln Mk cap)	26,379	13.33	9.067	16.44	1.415
Colombia	Beta	6,106	0.834	0.000*	3.895	0.429
	Book-to-Market	6,106	0.732	0.157	3.984	0.543
	Financial crisis (FC) (Dummy)	6,106	0.121	0	1	0.326
	Size (Ln Mk cap)	6,106	15.67	9.880	19.27	1.598
Mexico	Beta	15,500	0.868	8.33e-05	3.876	0.548
	Book-to-Market	15,500	0.651	0.101	3.995	0.474
	Financial crisis (FC) (Dummy)	15,500	0.094	0	1	0.292
	Size (Ln Mk cap)	15,500	10.19	4.311	14.17	1.602
Peru	Beta	5,646	0.797	0.000*	3.967	0.516
	Book-to-Market	5,646	0.730	0.046	3.945	0.612
	Financial crisis (FC) (Dummy)	5,646	0.141	0	1	0.348
	Size (Ln Mk cap)	5,646	7.473	2.862	11.34	1.850

Notes: Control variables descriptive statistics. All countries. * indicates a non-zero value before rounded to three decimal places.

4 Econometric estimation and results

We divide our empirical findings into three main sections: The first section presents the impact of firm level liquidity measures on the returns of Latin American firms. The second section examines the impact of financial crises and global liquidity on returns and liquidity. In section three, we explore the commonality in firm level liquidity / illiquidity proxies using factor analysis.

4.1 Firm level liquidity and returns

The econometric estimation takes advantage of the longitudinal structure of the data. We estimate equation 4 using fixed effect transformation with heteroscedastic robust standard errors:[5]

$$\begin{aligned} Return_{it} = \beta_0 &+ \beta_k Liquidity_{it} \\ &+ \beta_m Financial\ controls_{it} + \\ &+ \beta_n Year,\ Country,\ Industry\ Dummy_{it} + \epsilon_{it} \end{aligned} \tag{4}$$

Table 3 presents the panel regression results for the five firm level liquidity measures on returns. Due to correlation between liquidity measures, equation 4 is estimated separately for each liquidity (illiquidity) variable.[6] The first two equations show that Turnover and MVTN are positively and significantly associated with returns in Latin America. This finding supports the theoretical arguments of Maug (1998) in regards to the positive association between liquidity, corporate governance, and performance. These findings are also consistent with the work of Li et al. (2012) who demostrate that liquidity acts as a corporate governance mechanism and leads to higher valuations for Russian firms. Furthermore our findings support the recent empirical evidence presented for Vietnam by Batten and Vo (2014).

In contrast to developed markets, we fail to find support for an illiquidity premium in Latin America and argue that investors may overlook the illiquidity premium in emerging markets if diversification benefits are large enough (Batten and Vo, 2014). Alternatively, Turnover and MVTN could be capturing investor sentiment, whilst this relationship is capturing the impact of behavioral finance characteristics on equity prices. In either case, our baseline results demonstrate that more trading in Latin American equities positively impacts subsequent returns.

Our third firm level liquidity measure PZR, has interesting implications on the returns of Latin American firms, particularly given that many firms have a significant number of non-trading days. We find a positive association between returns and the percentage of zero return days. Stocks with a large number of zero return days are characterized by greater levels of information asymmetry. Therefore, the quoted price can deviate greatly from the fundamental value. Since PZR is an indirect measure of trading costs borne by informed traders, trades will only occur when the deviation between the quoted prices and fundamental value are large enough to offset these costs. Therefore, ex-post returns are higher in these securities.

The Amihud (2002) illiquidity measure ILQ as expected is negative and significant. This finding is consistent with our earlier results for Turnover and MVTN and casts further doubt on the

[5] The reported results are those corresponding to the fixed effects transformation method on which fixed time effects are removed (Baltagi, 2008; Wooldridge, 2012). We also considered pooled Ordinary Least Squares (OLS) and random effects transformation, however the results of the Haussman test favored the fixed effect estimation procedure. The results of the alternative estimations and tests are available upon request.

[6] The correlation matrix of the liquidity variables is presented in Table 11.

illiquidity premium in Latin America and illiquid markets in general. This result appears to confirm the positive (negative) role of liquidity (illiquidity) on equity returns in the largest Latin American equity markets.

Finally we directly explore the impact of trading costs of returns. The final equation of Table 3 presents the results for the BID-ASK spread. Higher spreads are associated with higher inventory holding costs, adverse selection costs, and larger order processing costs. For some Latin American firms these costs can be significant. For example the average BID-ASK spread in our sample is over 3%. Our results demonstrated that higher spreads are negatively related to returns. Therefore, efforts to reduce transactions costs will be a positive development for Latin American equity markets. These efforts should be particularly focused in Brazil where the BID-ASK spreads are the highest in our sample.

We report the coefficients on several control variables. The relationship between returns and Beta, while theoretically clear, has mixed empirical track record of explaining returns. Over our sample period, we find that returns are positively related to Beta as theoretically predicted. This finding is consistent across all empirical specifications. Book-to-Market is commonly used in empirical literature to explain returns. In many studies of developed markets book-to-market is observed to have a positive relationship with returns reflecting the fact that value stocks tend to outperform growth (glamor) stocks. We find the opposite effect in Latin America, as book-to market is negatively associated with returns indicating that growth stocks tend to outperform high book-to-market (value) stocks during our sample period.

Our finding on the relationship between firm size and returns is also in contrast to much of the empirical literature on developed markets. We find consistent across all regressions that size is associated with better returns in Latin America. In many studies on mature markets, a 'small firm' effect is documented, where smaller firms tend to outperform larger companies. We fail to uncover such a relationship in Latin America. This could be due to the corporate structure in Latin America. Latin American firms are characterized by large institutional block holders, high levels of family ownership, and substantial cross-holdings among industrial groups (Buchuk et al., 2014; Pombo and Taborda, 2015; De-La-Hoz and Pombo, 2016). These unique ownership structures are likely responsible for larger firms outperformance in Latin America.

To this point, we have documented that returns and liquidity (illiquidity) are positively (negatively) related in Latin America. Furthermore, we show that this relationship depends on which aspect of liquidity is being measured. Liquidity has multiple dimensions and each dimension impacts returns differently during the past tumultuous decade. We now proceed to investigate the impact of global liquidity and endogenously determined financial crises on returns for Latin American firms.

Table 3. Baseline model regression results

Firm level liquidity					
Turnover (Ln)	0.223^a				
	(0.0260)				
MVTN (Ln)		0.209^a			
		(0.0260)			
PZR			1.485^a		
			(0.325)		
ILQ (Ln)				-0.232^a	
				(0.0237)	
Bid-Ask					-2.575^a
					(0.998)
Control					
Beta	0.393^a	0.397^a	0.395^a	0.403^a	0.468^a
	(0.0837)	(0.0832)	(0.0822)	(0.0901)	(0.0859)
Book-to-Market	-1.641^a	-1.638^a	-1.637^a	-1.706^a	-1.618^a
	(0.173)	(0.171)	(0.165)	(0.197)	(0.171)
Size (Ln Mk cap)	0.464^a	0.686^a	0.711^a	0.408^a	0.667^a
	(0.140)	(0.136)	(0.134)	(0.151)	(0.139)
Observations	58,142	58,654	59,951	52,346	55,192
Number of Country-equities	209	209	212	201	205
R^2	0.0500	0.0498	0.0502	0.0521	0.0461
F-stat	221.2	222.7	227.1	210.2	189.2

Notes: Dependent variable: Returns. Heteroscedastic robust standard errors. Standard errors in parentheses. $a\ p < 0.01$, $b\ p < 0.05$, $c\ p < 0.1$.

4.2 Returns, financial crisis, and global liquidity

Brockman et al. (2009) study commonality in liquidity. Commonality in liquidity refers to the impact of a global (or market wide) liquidity factor impacting firm level liquidity. Inspired by this work, we investigate the role of market wide liquidity on firm-level returns in Latin America. Furthermore, since global liquidity factors can influence firm level liquidity controlling for market liquidity is an important robustness check on the return liquidity relationships analyzed in the previous section. Following the data description in section 3, financial crisis dummies and a global liquidity measure are added as explanatory variables to equation 4. Formally we estimate the following equation

$$\begin{aligned} Return_{it} = \beta_0 &+ \beta_k Liquidity_{it} + \beta_{gl} Global\ Liquidity + \beta_{fc} FC \\ &+ \beta_m Financial\ controls_{it} \\ &+ \beta_n Year,\ Country,\ Industry\ Dummy_{it} + \epsilon_{it} \end{aligned} \tag{5}$$

The estimation results are shown in table 4. We observe that all five firm level liquidity factors remain significant and consistently signed with our previous analysis reinforcing the positive (negative) association between returns and liquidity (illiquidity). Furthermore, signs on all control variables remain significant and do not display any sign changes.

The coefficient on the VIX is consistently negative across all empirical specifications and significant at the 1% level. The VIX index is a measure of risk aversion and as this measure increases returns in Latin American firms are adversely impacted. Typically, when the VIX increases in-

Table 4. Financial crisis and global liquidity regression results

Firm level liquidity					
Turnover (Ln)	0.216^a				
	(0.0257)				
MVTN (Ln)		0.202^a			
		(0.0258)			
PZR			1.103^a		
			(0.321)		
ILQ (Ln)				-0.166^a	
				(0.0236)	
Bid-Ask					-0.785
					(0.969)
Global liquidity					
VIX	-0.0900^a	-0.0906^a	-0.0890^a	-0.0905^a	-0.101^a
	(0.00587)	(0.00585)	(0.00577)	(0.00642)	(0.00620)
Fin. Crisis					
Financial crisis (FC) (Dummy)	-2.726^a	-2.696^a	-2.686^a	-2.753^a	-2.533^a
	(0.133)	(0.132)	(0.131)	(0.144)	(0.135)
Control					
Beta	0.396^a	0.400^a	0.401^a	0.417^a	0.463^a
	(0.0830)	(0.0825)	(0.0816)	(0.0893)	(0.0852)
Book-to-Market	-1.309^a	-1.319^a	-1.350^a	-1.370^a	-1.321^a
	(0.170)	(0.168)	(0.162)	(0.194)	(0.169)
Size (Ln Mk cap)	0.341^b	0.559^a	0.585^a	0.381^b	0.528^a
	(0.138)	(0.134)	(0.132)	(0.149)	(0.137)
Observations	58,142	58,654	59,951	52,346	55,192
Number of Country-equities	209	209	212	201	205
R^2	0.0716	0.0713	0.0712	0.0730	0.0683
F-stat	247.7	249.4	252.9	230.4	216.4

Notes: Dependent variable: Returns. Heteroscedastic robust standard errors. Standard errors in parentheses. a $p < 0.01$, b $p < 0.05$, c $p < 0.1$.

vestors retrench to 'safe haven' investments and liquidity in speculative assets declines. Our analysis supports this idea and demonstrates that spikes in global illiquidity is particularly negative for the returns in Latin America. Our results are consistent with the work of Amihud (2002) who examined the October 19th, 1987 stock market crash. Amihud (2002) shows that the 1987 crash was associated with an increase in market illiquidity and the subsequent recovery with an improvement in liquidity.

We next consider the impact of endogenously determined financial crisis periods within each market. While the VIX measures global illiquidity, our financial crisis indicator measures a financial crisis within a given country's market. As expected financial crisis periods have a significantly negative impact on returns. These results are strongly significant across all empirical specifications. We note that firm level liquidity (illiquidity) remain significant in explaining returns with the inclusion of financial crisis month, confirming that our finds are not an artifact of financial crisis periods.

4.3 Liquidity measures commonality

In order to bring together the multiple dimensions of observed liquidity (illiquidity) measures, we employ factor analysis. Using principal component analysis as the estimation method, factor analysis is able to create variables related with unobserved or underlying factors of observed variables. In this study the unobserved factors are the liquidity and illiquidity proxied with different measures, based on data availability. Factor analysis is an appropriate tool to inquire about the impact of liquidity (illiquidity) as a whole. Furthermore, factor analysis allows us to understand how much of the observed variables group is commonality and how much is unique around the factors.

Given the variance-covariance structure of the variables of interest, factor analysis defines as many factors as variables in the analysis. Each factor orthogonal to the previous one up to the point there is no more variance between the variables to be examined. In addition to the standard dimensionality reduction via principal component analysis, factor analysis responds to certain predefined concepts underlying the observed variables (i.e. liquidity and illiquidity). In our case the first two factors account for a 72% of the variance of our observed liquidity and illiquidity variables. These two factors have the (rotated) loadings shown in Table 5. Loadings reflect the correlation between each variable and the factor. The first loading vector is termed the 'liquidity factor'. This is due to the fact that measures associated with liquidity are positively signed and measures associated with illiquidity have negative signs. The second factor is termed the 'illiquidity factor' due to the positive (negative) signs on illiquidity (liquidity) measures.

The predicted liquidity and illiquidity factors obtained from the analysis are constructed using the following scoring coefficients:[7]

$$\begin{aligned} \textit{Factor 1 (Liquidity)} = {} & 0.4841 \times \textit{Turnover (Ln)} + 0.2368 \times \textit{MVTN (Ln)} + 0.0944 \times \textit{PZR} \\ & - 0.4147 \times \textit{ILQ (Ln)} + 0.2410 \times \textit{Bid-Ask} \end{aligned} \tag{6}$$

$$\begin{aligned} \textit{Factor 2 (Illiquidity)} = {} & 0.2461 \times \textit{Turnover (Ln)} - 0.1290 \times \textit{MVTN (Ln)} - 0.3639 \times \textit{PZR} \\ & - 0.0909 \times \textit{ILQ (Ln)} + 0.8411 \times \textit{Bid-Ask} \end{aligned} \tag{7}$$

The predicted values of both vectors are used as explanatory variables in a new set of regressions in the same vein as equations 4 and 5. One of the benefits of this method is that, given its construction, both liquidity and illiquidity factors are orthogonal and can be included within the same regression, a practice that would render questionable coefficients due to collinearity if done with the proxies.

$$\begin{aligned} \textit{Return}_{it} = {} & \beta_0 + \beta_{liq}\textit{Liquidity factor}_{it} + \beta_{ill}\textit{Illiquidity factor}_{it} \\ & + \beta_{gl}\textit{Global Liquidity} + \beta_{fc}\textit{FC} \\ & + \beta_m\textit{Financial controls}_{it} \\ & + \beta_n\textit{Year, Country, Industry Dummy}_{it} + \epsilon_{it} \end{aligned} \tag{8}$$

Table 6 report the results of regressions containing the liquidity and illiquidity factors. The results demonstrate a jointly significant positive (negative) association between liquidity (illiquidity) and returns for Latin American firms. When firm level controls and global illiquidity

[7] In other words, these coefficients or scorings form Factor 1 (Liquidity) and Factor 2 (Illiquidity) such that these factors show the correlation structure summarized by the loadings reported in Table 5.

Table 5. Eigenvalues and rotated factors loadings

	Eigenvalues				
	Factor1	Factor2	Factor3	Factor4	Factor5
Eigenvalues	2.685	0.923	0.643	0.569	0.177
Sum Eigenvalues	5	5	5	5	5
Proportion	0.537	0.184	0.128	0.113	0.035
Cumulative	0.537	0.721	0.850	0.964	1
Uniqueness	0.131	0.475	0.467	0.182	0.134

Rotated loadings		
	Factor1	Factor2
Turnover (Ln)	0.931	-0.030
MVTN (Ln)	0.638	-0.342
PZR	0.482	-0.546
ILQ (Ln)	-0.885	0.183
Bid-Ask	-0.061	0.928

Table 6. Liquidity / Illiquidity factor variables regression results

Factor			
Liquidity Factor (Rotated)	1.176^a	0.758^a	0.682^a
	(0.0803)	(0.0847)	(0.0840)
Illiquidity Factor (Rotated)	-0.416^a	-0.275^a	-0.181^a
	(0.0585)	(0.0588)	(0.0572)
Global liquidity			
VIX			-0.105^a
Fin. Crisis			
Financial crisis (FC) (Dummy)			-2.629^a
			(0.148)
Control			
Beta		0.421^a	0.428^a
		(0.0940)	(0.0931)
Book-to-Market		-1.737^a	-1.336^a
		(0.205)	(0.202)
Size (Ln Mk cap)		0.317^b	0.237
		(0.157)	(0.154)
Observations	48,207	48,207	48,207
Number of Country-equities	195	195	195
R^2	0.0460	0.0522	0.0752
F-stat	190.4	161.1	184.9

Notes: Dependent variable: Returns. Heteroscedastic robust standard errors. Standard errors in parentheses. $a\ p < 0.01$, $b\ p < 0.05$, $c\ p < 0.1$.

are added the relationship is not altered and controls are consistently signed with earlier results. These results clearly indicate that liquidity is an import factor in understanding returns in Latin America. These results partially stem from the fact that in illiquid markets, market liquidity improves information dissemination, governance, and firm performance. Mechanisms in emerging markets to reduce illiquidity should be welcome by investors and traders and are useful in supporting existing corporate governance mechanisms.

Table 7. Robustness check. January only

Firm level liquidity					
Turnover (Ln)	0.114				
	(0.0824)				
MVTN (Ln)		0.108			
		(0.0829)			
PZR			1.584		
			(1.193)		
ILQ (Ln)				-0.126c	
				(0.0736)	
Bid-Ask					1.290
					(2.962)
Control					
Beta	0.762a	0.739a	0.752a	0.751a	0.809a
	(0.249)	(0.248)	(0.245)	(0.263)	(0.259)
Book-to-Market	-2.504a	-2.561a	-2.661a	-2.982a	-2.573a
	(0.528)	(0.525)	(0.515)	(0.583)	(0.536)
Size (Ln Mk cap)	-0.369	-0.279	-0.262	-0.649	-0.205
	(0.414)	(0.405)	(0.404)	(0.458)	(0.426)
Observations	5,516	5,539	5,663	4,943	5,085
Number of Country-equities	186	187	190	173	183
R2	0.179	0.179	0.181	0.200	0.191
F-stat	111.1	111.5	114.2	115.7	112.1

Notes: Dependent variable: Returns. Heteroscedastic robust standard errors. Standard errors in parentheses. a $p < 0.01$, b $p < 0.05$, c $p < 0.1$.

4.4 Robustness checks

We perform a series of robustness checks. In particular, we estimate the following three variations of the baseline model: 1) January data only, 2) Excluding January, and 3) Including a one period lag of returns to capture momentum. These results are shown in Tables 7, 8, and 9 respectively.

The importance of seasonality in stock returns is a common finding in empirical literature (Chui and Wei, 1998; Chan and Faff, 2005). For example, Eleswarapu and Reinganum (1993) in a re-examination of Amihud and Mendelson (1986)'s work show that the positive illiquidity-return relationship is primarily limited to January. To investigate the widely observed January effect in Latin America, we estimate regressions with only January data and excluding January data similar with the approach of Batten and Vo (2014). These results are reported in Tables 7 and 8 respectively. Table 7 demonstrates that the liquidity - return relationships are not important when only January returns are included in the regressions. However, we note that coefficients remain signed consistently with earlier results. Results reported in Table 8 excluding January reinforce our earlier results and demonstrate a robust relationship between various aspects of liquidity and returns in Latin America.

Lee and Swaminathan (2000) show the importance of equity momentum on volume. In particular, they argue that price momentum induces a relationship between turnover and expected returns, which may not have anything to do with liquidity. However, Chordia et al. (2001) when controlling for momentum find that there remains a significant cross-sectional relationship between returns and liquidity.[8] Table 9 reports the results of our liquidity regressions controlling

[8] Additional empirical evidence is provided in Keene and Peterson (2007) who control for size, book-to-market, and

Table 8. Robustness check. No January

Firm level liquidity					
Turnover (Ln)	0.230a				
	(0.0271)				
MVTN (Ln)		0.217a			
		(0.0271)			
PZR			1.301a		
			(0.338)		
ILQ (Ln)				-0.220a	
				(0.0248)	
Bid-Ask					-2.722a
					(1.050)
Control					
Beta	0.389a	0.393a	0.392a	0.393a	0.455a
	(0.0875)	(0.0870)	(0.0861)	(0.0943)	(0.0896)
Book-to-Market	-1.497a	-1.493a	-1.472a	-1.548a	-1.466a
	(0.182)	(0.180)	(0.173)	(0.208)	(0.180)
Size (Ln Mk cap)	0.635a	0.866a	0.902a	0.626a	0.848a
	(0.147)	(0.142)	(0.141)	(0.158)	(0.145)
Observations	52,621	53,110	54,283	47,393	50,098
Number of Country-equities	209	209	212	201	204
R2	0.0479	0.0478	0.0478	0.0495	0.0431
F-stat	196.8	198.1	200.6	185.6	164

Notes: Dependent variable: Returns. Heteroscedastic robust standard errors. Standard errors in parentheses. $a\ p < 0.01$, $b\ p < 0.05$, $c\ p < 0.1$.

for momentum. The results indicate that stock returns in Latin America demonstrate a strong momentum effect, and liquidity remains an important indicator of returns even when controlling for momentum with the exception of the bid-ask spread. Beta and Size become insignificant when momentum is included potentially indicating the relative importance of trend-chasing behavior in Latin America.

momentum.

Table 9. Robustness check. Momentum

Firm level liquidity					
Turnover (Ln)	0.170a				
	(0.0180)				
MVTN (Ln)		0.170a			
		(0.0181)			
PZR			0.668a		
			(0.235)		
ILQ (Ln)				-0.108a	
				(0.0151)	
Bid-Ask					0.0407
					(0.769)
Momentum					
Return (Lag)	0.762a	0.762a	0.762a	0.767a	0.761a
	(0.00355)	(0.00354)	(0.00351)	(0.00367)	(0.00367)
Control					
Beta	0.0360	0.0335	0.0521	0.0495	0.0831
	(0.0554)	(0.0552)	(0.0548)	(0.0584)	(0.0571)
Book-to-Market	-0.397a	-0.410a	-0.436a	-0.475a	-0.454a
	(0.127)	(0.125)	(0.120)	(0.140)	(0.124)
Size (Ln Mk cap)	-0.118	0.0368	0.0586	-0.0899	0.0585
	(0.0939)	(0.0913)	(0.0899)	(0.0995)	(0.0935)
Observations	55,253	55,710	56,958	50,916	52,641
Number of Country-equities	202	202	205	197	201
R2	0.601	0.600	0.600	0.604	0.595
F-stat	3907	3930	3995	3735	3599

Notes: Dependent variable: Returns. Heteroscedastic robust standard errors. Standard errors in parentheses. $a\ p < 0.01$, $b\ p < 0.05$, $c\ p < 0.1$.

5 Conclusion and closing thoughts

How is liquidity related to returns in illiquid markets? While existent literature documents an illiquidity premium in developed markets, relatively little work has focused on the impact of various aspects of liquidity in the developing markets of Latin America. Liquidity has multiple dimensions encompassing turnover measures, price impact, and trade costs. In this paper, we explore how these various facets of liquidity impact returns.

We show that liquidity (illiquidity) is positively (negatively) associated with returns. These findings are consistent with the emergent literature showing that more liquid firms in developing markets have higher valuations due to better governance mechanisms. These results may also be viewed through the lens of the literature on investor sentiment. Several researchers have used turnover in various forms as a proxy for positive market sentiment. Our results support these findings of a positive relationship between sentiment and returns in Latin America. In the next phase of our analysis, we consider the impact of endogenously determined financial crises periods and global illiquidity on the returns of Latin American firms. We document a strong and very significant negative impact of global illiquidity and financial crises on returns. However, importantly the positive (negative) relationships between firm level liquidity (illiquidity) proxies remain significant and consistently signed during periods of financial crisis and global illiquidity. These results demonstrate that Latin American firms are adversely impacted by contractions in

global liquidity, but that this adverse impact is mitigated by greater firm level liquidity.

Finally, we use factor analysis to reduce the multiple dimensions of firm level liquidity and construct a liquidity and an illiquidity index. Consistent with earlier results, we find a positive (negative) association between our constructed liquidity (illiquidity) indexes. In a series of robustness checks, we consider the well-known January anomaly and return momentum. Our results remain consistent when we control for these additional factors.

Overall our results are in contrast to the findings of an illiquidity premium in mature markets. These results stem from three potential influences: 1) The diversification benefits of investing in Latin America outweigh the negative aspects of illiquidity, 2) The positive impact of liquidity is partially due to greater levels of liquidity increasing market monitoring of management, which leads to superior corporate governance and returns, and 3) Greater liquidity is due to positive market sentiment and therefore positively associated with returns.

Our research has direct policy implications for Latin America and other emerging markets. Any measures to improve the liquidity of these markets should enhance returns and reduce the negative impacts of periods of global illiquidity.

Appendices

1 Additional estimation results

Table 10. Variable definitions

Turnover (Ln)	Natural logarithm of the number of shares of stock i traded to the number of shares outstanding.
Bid-Ask	BID-ASK $= \frac{\text{Ask - Bid}}{\text{Ask}}$.
ILQ (Ln)	ILQ $= \overline{\left(\frac{\lvert \text{RET}_d \rvert}{\text{Volume}_d}\right)} * 10^6$ where the subscript d denotes a day, and the bar represents the sample average.
MVTN (Ln)	Natural logarithm of the value of shares of stock i traded to market capitalization of firm i.
PZR	PZR $= \frac{\sum zr_d}{dym}$ where zr_d is the dummy for zero-return day (i.e. $zr_d = 1$ if $\text{RET}_d = 0$ and zero otherwise), and dym = number of trading days in a firm month.

Notes: This table provides the definitions of the variables used in this study.

Table 11. Correlation matrix return and liquidity measures

	Return	Bid-Ask	ILQ (Ln)	MVTN (Ln)	PZR	Turnover (Ln)
Return	1.0000	-0.0256	-0.0254	0.0277	0.0080	0.0141
Bid-Ask	-0.0256	1.0000	0.2832	-0.2971	-0.3231	-0.1742
ILQ (Ln)	-0.0254	0.2832	1.0000	-0.4520	-0.4802	-0.7987
MVTN (Ln)	0.0277	-0.2971	-0.4520	1.0000	0.3640	0.5185
PZR	0.0080	-0.3231	-0.4802	0.3640	1.0000	0.3738
Turnover (Ln)	0.0141	-0.1742	-0.7987	0.5185	0.3738	1.0000

Notes: Correlation matrix return and liquidity measures. All countries.

2 Acronyms

BID-ASK	bid-ask
CMAX	Current to Maximum price
GFC	Global Financial Crisis
ILQ	Iliquidity Ratio
MVTN	Market Value Turnover
OLS	Ordinary Least Squares
PZR	Proportion of Zero Return days
RET	Return
VIX	Chicago Board Options Exchange Volatility Index

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